PRE-APPEAL BRIEF REQUEST FOR REVIEW	Docket Number (Optional): P156C1-US

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	First Named Inventor: Stevens	
	Art Unit: 2128	Examiner: Kibrom Gebresilassie

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest.
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed.
(Form PTO/SB/96)

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Registration number: 55,561

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Note: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required.
Submit multiple forms I more than one signature is required, see below*.

☐ *Total of __ form(s) are submitted.

ARGUMENTS SUPPORTING PRE-APPEAL BRIEF REQUEST FOR REVIEW

In support of Applicants' Pre-Appeal Brief Request for Review of the final rejection in the Office Action dated October 14, 2009, Applicants respectfully submit the following:

I. Background: Claims 2, 3, 6-11, 18, 21, 44, 48 and 55-58 are pending and stand rejected as allegedly being obvious over U.S. Pub. No. 2001/0038612 to Vaughn and U.S. Patent No. 6,385,758 to Kikuchi. Applicants request review of the rejections of each of independent claims 2 and 18. Claims 2 and 18 also stand rejected as under the judicially created doctrine of obviousness type double patenting. Applicants will file a terminal disclaimer, if necessary, to overcome the double patenting rejection after all other issues have been resolved.

By way of a non-limiting introductory discussion, the present application discloses automatic routing of traces or wiring (original specification: para. 22). Two different aspects of performing routing are described: creating an array of nodes within the routing space, and determining a path through the array of nodes.

The initial array of nodes can be defined within the routing space (para. 28), and the initial array of nodes can be adjusted in relation to obstacles (para. 34). Adjusting the array of nodes can thus take into account the obstacles and design rule constraints (para. 34). The adjusted array of node can be linked together, so that each link represents a possible portion of a route for a trace (para. 68). In other words, the linked nodes can represent *potential* routing paths between nodes that account for design rules and obstacle (para. 80). Creating the adjusted array of nodes is therefore separate and distinct from actually routing traces (para. 116).

Once generated, the adjusted array of nodes can be used for routing traces (para. 84). Routing can start from a source node, and then consider multiple nodes which can be selected for the trace to follow (para. 86). Multiple paths can be considered and higher cost paths discarded (para. 95; 102). The process can be repeated, until the destination node is reached (para. 109). Note that movement of the nodes during the routing is not necessary, since constraints (obstacles, design rules) are accounted for by the adjusted array of nodes.

The foregoing are not the only embodiments disclosed, and the claims are not necessarily limited to any of the embodiments discussed above.

In contrast, Vaughn teaches a routing approach which starts with nodes tied to particular traces (publication 2001/0038612, para. 67; 89). Thus, Vaughn uses the term "node" differently than in the present application and claims. Further, Vaughn teaches that routing consists of first connecting the nodes (traces) "without regard to crowding or angles" (para. 104). Traces are initially positioned without consideration for obstacles and routing density (para. 106-107; FIG. 4). Only then does Vaughn take into

account obstacles and design constraints, adjusting his traces as necessary (para. 128; FIG. 9A). Vaughn therefore never creates an initial array of nodes which are then later used to select paths for traces as in the present application.

Kikuchi is not directed to routing, but rather to a technique for compacting an already created layout (Abstract; col. 4, lines 40 – col. 5, line 13). Kikuchi discloses that the input to his system is a layout which already defines positions of components, traces, and vias (col. 7, lines 57-67). Kikuchi does not perform routing, but rather calculates amounts that already routed components, traces, and vias can be moved to reduce overall layout size (col. 11, line 20 – col. 13, line 10). The positions of the routed components are the adjusted by allowable compaction amounts (col. 26, line 61 – col. 27, line 17).

Accordingly, the combined teachings of Vaughn and Kikuchi, considered as a whole, would fail to lead a person of ordinary skill in the art to the present invention. Each reference starts with nodes that are intimately tied to particular traces. Neither reference teaches or suggests providing an adjusted array of nodes to account for obstacles, and then determining routing paths through the adjusted array of nodes.

The Examiner appears to be using impermissible hindsight reasoning to reconstruct the present invention by picking and choosing individual aspects of the cited references taken out of the context in which they are provided. Furthermore, at least some of the claimed features are not disclosed by the cited references as incorrectly alleged by the Examiner.

Now, turning to the rejections in detail, the following specific errors in the rejections are discussed.

II. **Independent Claim 2:** Claim 2 recites the feature of "creating an initial array of nodes within the proposed physical layout." The Examiner incorrectly equates this feature to Vaughn's traces. Vaughn discloses that "input data is defined in terms of point-to-point connections of the nodes in the circuit." Vaughn's nodes are tied to particular components, and therefore differ from the nodes of claim 2. Vaughn's nodes are only defined in relation to particular trace and each of Vaughn's nodes has a one-to-one correspondence to a traces. Thus, Vaughn's nodes cannot exist independent of a trace. More particularly, Vaughn's nodes are not suitable for being used in "creating … a trace by selecting a path though said adjusted array" as presently claimed, since Vaughn's nodes are a particular trace. Thus it not possible to select any nodes for a path, since to do so would result in inappropriate connections not corresponding to Vaughn's net list. Accordingly, the rejection is in clear error for at least this reason.

In rebuttal to Applicant's arguments, the Examiner erroneously states "[a]s claimed limitation indicated, the node is corresponding to the number of traces. Therefore, if there is a trace, then it is inherent to have a node or vise [sic] versa." If the Examiner is relying on Applicant's disclosure to argue inherency in the cited reference, this is clearly improper. If the Examiner is arguing claim interpretation,

this is also incorrect. The claimed operation of "creating .... a trace by selecting a path through said adjusted array" makes it clear that nodes are created and adjusted *before* any assignment of traces to nodes is made. Once the nodes are created and adjusted, some nodes may be assigned to traces. Not every node in the claimed initial array of nodes need be assigned to a trace, however. Accordingly, it is not inherent to have a trace wherever there is a node in the present claims. Accordingly, the rejection is in clear error for at least this additional reason.

Claim 2 further recites "adjusting ... said initial array of nodes ... locating a particular number of nodes between a pair of said obstacles ... corresponding to a maximum number of traces that can pass between said obstacles." The Examiner correctly admits this feature is not disclosed by Vaughn. Kikuchi also fails to disclose this feature. The Examiner cites Kikuchi's calculation of a routing zone "which is a bus of the width of the route and the widths of necessary gaps above and below the route" (col. 10, lines 5-7). Calculating a width of a single trace is distinctly different than calculating a number of traces that can pass between a pair of obstacles. Moreover, Kikuchi has no need to make such a calculation, since his system never actually places traces between obstacles; the input to his system is already routed traces (Abstract; col. 4, lines 40 – col. 5, line 13). Further, since Kikuchi discloses moving components (col. 11, lines 20-27; FIG. 8), any such maximum number of traces would be a meaningless quantity as it would continually change as components are moved. Accordingly, the rejection is in clear error for at least this additional reason.

In rebuttal to Applicant's arguments, the Examiner erroneously argues that "if the sum of the width of a route and a necessary gap are calculated, than it is obvious to one of ordinary skill in the art to know the number of traces that can pass through the obstacles." The cited references, however, teach the contrary. As noted above, Kikuchi has no need to calculate a maximum number of traces between obstacles, as such a quantity would be irrelevant to the predefined number of traces already existing between any obstacles, and further such a quantity would vary as his compaction is performed. Vaughn also has no need to make such a calculation, as his routing approach is to initially define his traces without regard to obstacles (para. 116), and then to incrementally reposition his traces (para. 68; 150-154; FIGS 11A-11E). Moreover, Vaughn appears to disclose moving paths or objects using a density metric. Thus, a calculation of a maximum number of traces would be useless in Vaughn's system, and thus would not be obvious to a person of ordinary skill in the art. The rejection is therefore in clear error for at least this additional reason.

Claim 2 also recites the feature of "selecting a path through said adjusted array of nodes." The Examiner erroneously alleges this feature is disclosed by Vaughn citing the abstract (but no specific teachings in Vaughn). Vaughn, however, does not select a path through his nodes. As noted above, Vaughn's nodes define a trace connection to a terminal or another trace (para. 89). Vaughn discloses that

routing involves incrementing moving his initially orthogonalized traces (para. 153, 154). No selecting a path *through* nodes is performed. Rather, a path is already defined and then moved. The rejection is therefore in clear error for at least this additional reason.

Finally, the Examiner argues a person of ordinary skill in the art would combine the teaching of Kikuchi with the teachings of Vaughn because "both references drawn [sic] to automatic routing system for circuit layout" further arguing that "[T]he motivation to do so would be to reserve a sufficient space between the routes or wires so as to suppress occurrence of crosstalk therebetween (citing Kikuchi). Vaughn and Kikuchi, however, teach differing and incompatible approaches. Vaughn breaks his routing problem into "zone quanta" which allows routing of *all* traces to be considered in a smaller area (para. 157-158). Vaughn specifically teaches the undesirability of routing a single trace at a time across the entire board (para. 178). In contrast, Kikuchi considers a single trace at a time in his calculations of routing zones (col. 10, lines 3-43). Accordingly, a person of ordinary skill in the art would not be motivated to modify Vaughn with the teachings of Kikuchi as alleged by the Examiner. Such a modification would go directly against the teachings of Vaughn that considering one entire trace at a time is undesirable. Therefore, for at least this additional reason, the rejection is in clear error.

In light of the numerous errors in the rejections of claim 2, the rejection should be withdrawn. The rejections of dependent claims 3, 6-11, 44 and 55-56 all rely on the rejection of claim 2, and are therefore also in clear error for at least the above reasons and should be withdrawn.

III. Independent Claim 18: Claim 18 recites "creating an initial array of nodes" and "selecting a path through said adjusted array of nodes" as in claim 2. The Examiner erroneously cites Vaughn for these features as discussed above for claim 2. Accordingly, the rejection of claim 18 is in clear error for at least the reason that Vaughn fails to disclose these features as discussed above for claim 2.

Claim 18 also cites the feature of "applying force to ones of said nodes … magnitude … is proportional to a proximity … to said obstacles." The Examiner correctly admits this feature is not disclosed by Vaughn, but erroneously alleges that Kikuchi teaches this feature. The Examiner cites Kikuchi's teaching that "[C]alculation is made of the limit movable distance within which one node is movable toward the other node in a moving direction via the routing zone including the routes and the necessary gap interposed therebetween" (col. 5, lines 26-32). Calculating a *distance* is different than assigning a *force*. Kikuchi only discloses calculating a distance, and fails to disclose calculating any quantity (e.g., a force) which is proportional to his distance. Accordingly, the rejection is in clear error for at least this additional reason.

Claim 18 also cites the feature of "moving … each of said nodes in accordance with said force." The Examiner correctly admits this feature is not disclosed by Vaughn and erroneously cites Kichuchi.

Kichuchi, however, moves his traces based on the allowable movement distances (col. 5, lines 37-40). Kikuchi therefore fails to disclose anything analogous to moving nodes in accordance with a calculated force. The rejection is therefore in clear error for at least this additional reason.

In rebuttal to Applicant's arguments, the Examiner further argues that application of a force and movement in accordance with the force is inherent in the Kikuchi reference. The Examiner further alleges that "[I]t is well known if there is a movement, there is an applied force." This allegation is incorrect. Movement of a node within a computer based routing system can be performed by merely rewriting the coordinates of the node. For example, Vaughn discloses that node positions are defined by coordinates, and that coordinates can be changed in various manners which does not require applying a force (para. 89; 106; 114). Conversely, a force could be assigned to a node, yet the node held in a fixed position. For example, Kikuchi discloses that some node positions can be held fixed (col. 12, lines 60-66). The Examiner has failed to show that a person of ordinary skill in the art would necessarily conclude form the cited references that movement of a node necessarily requires an applied force. The rejection is therefore in clear error for at least this additional reason.

In light of the numerous errors in the rejections of claim 18, the rejection should be withdrawn. The rejections of dependent claims 21, 48 and 57-58 all rely on the rejection of claim 18, and are therefore also in clear error for at least the above reasons and should be withdrawn.

IV. Conclusion: In view of the foregoing, Applicants respectfully submit that the rejection of all of the claims should be withdrawn. As the Examiner is assumed to have cited the most relevant prior art per MPEP 706.02(I) and 2106(III) all claims are therefore allowable and should be passed to issue.